Jakarta International School

8th Grade – AG1

Practice Test - Blue

Unit 2: Graphing

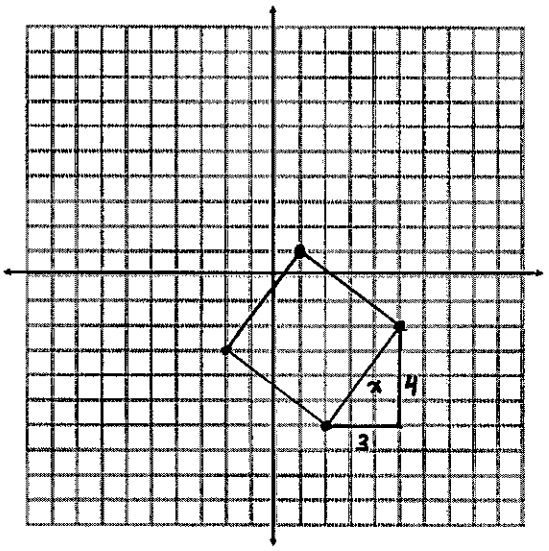
Name: SOLUTIONS

Date:

Score: ___/70

Goal 4: Students convert graphical, symbolic, and numerical representations of data

1. The points (-2,-3), (2,-6), and (5,-2) are three vertices of a square.



   a. What are the coordinates of the fourth vertex? (1,1) (1 pt)

   b. Find the square's side length?

$3^2 + 4^2 = x^2$

$9 + 16 = x^2$

$25 = x^2$

$x = 5$ (1 pt)

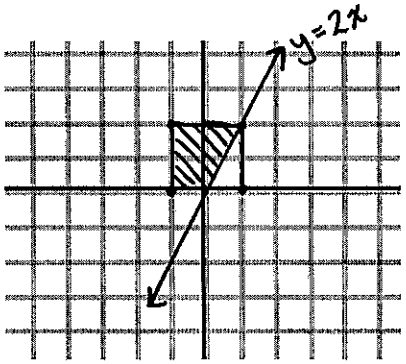
2. What can be determined about the signs of x and y if (x,y) lies...

   a) in the second quadrant? (1 pt) $x < 0$ and $y > 0$

   b) below the origin on the y-axis? (1 pt) $x = 0$ $y < 0$

3. The line through the points (-5, 1) and (-1, 3) passes through every quadrant except one. Which one? (1 pt) ~~4~~ Quadrant 4

4. A point is randomly selected from within the rectangle having vertices (-1,0), (1,0), (-1,2), and (1,2). What's the probability that the x-coordinate will be less than a half of the y-coordinate? (2 pts) $x < \frac{1}{2}y$



First find the points where $x = \frac{1}{2}y$ by graphing the line $y = 2x$.

Then, identify the region where $x < \frac{1}{2}y$. The shaded region is the desirable region.

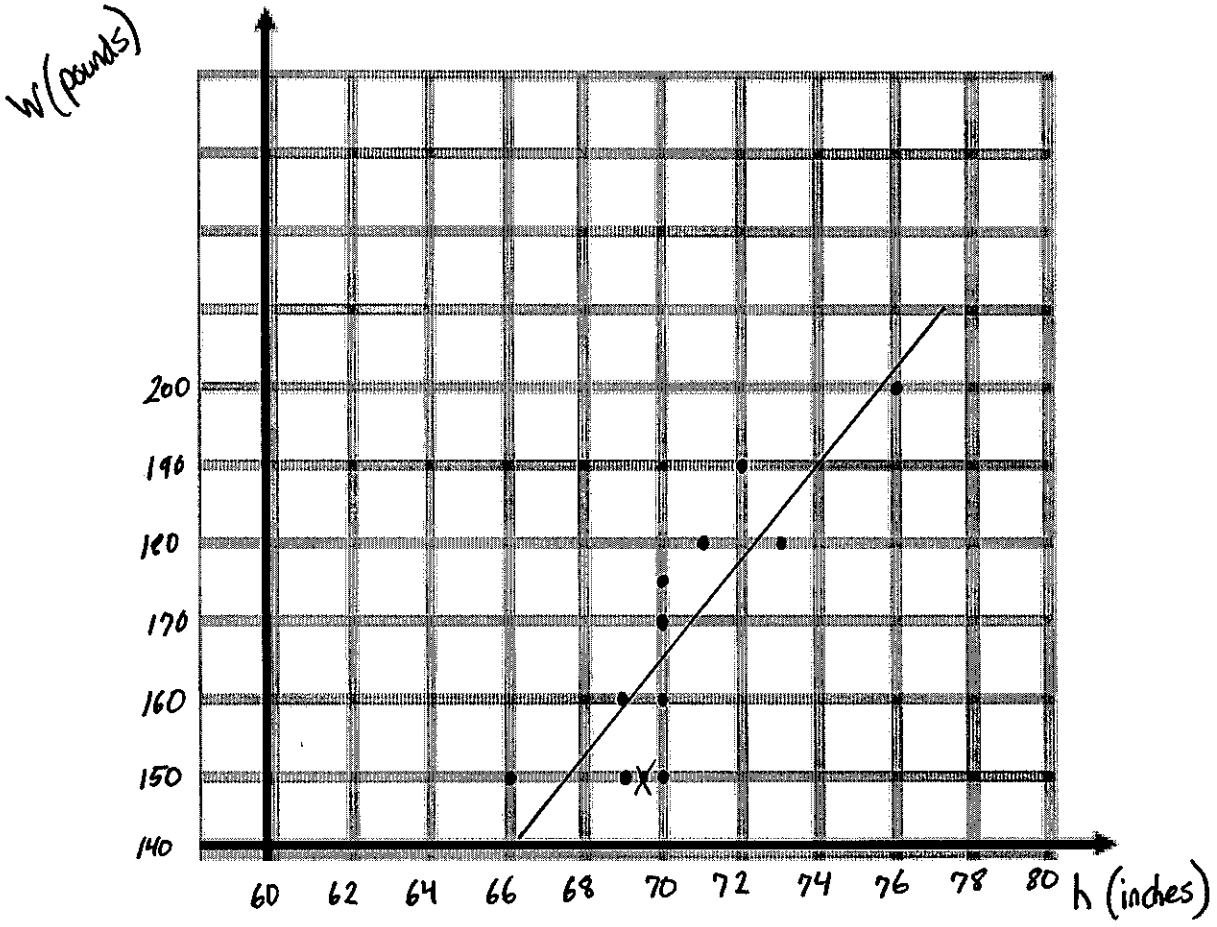
Last, the probability that $x < \frac{1}{2}y$ equals the ratio of the desirable region's area to the total area. $= \frac{3}{4}$

5. You are the student manager of your high school soccer team. You are working on the team's program guide and have recorded the height and weight of the team's eleven players.

* Identify the minimum and maximum of each data set to help scale your axes.

Height (in.)	72	70	71	70	69	70	69	73	66	70	76	min = 66 max = 76
Weight (pounds)	190	170	180	175	160	160	150	180	150	150	200	min = 150 max = 200

a. Make a scatter plot of the data. Put height h on the horizontal axis and weight w on the vertical axis. (2 pts)



b. Use a line of best fit to estimate the weight of a player who is 74 inches tall. (2 pts)

190 pounds

c. Describe the relationship between the heights and weights of the team's members? (1 pt)

As the players heights increase, their weights generally increase as well.

6. Two lines defined by the equations $y = mx - 5$ and $y = 2x + b$, where m and b are constants, intersect at the point (3,1). What is the value of $b + m$? (1 pt)

Substitute to find the values of b and m

$y = mx - 5$ $\quad$ $y = 2x + b$

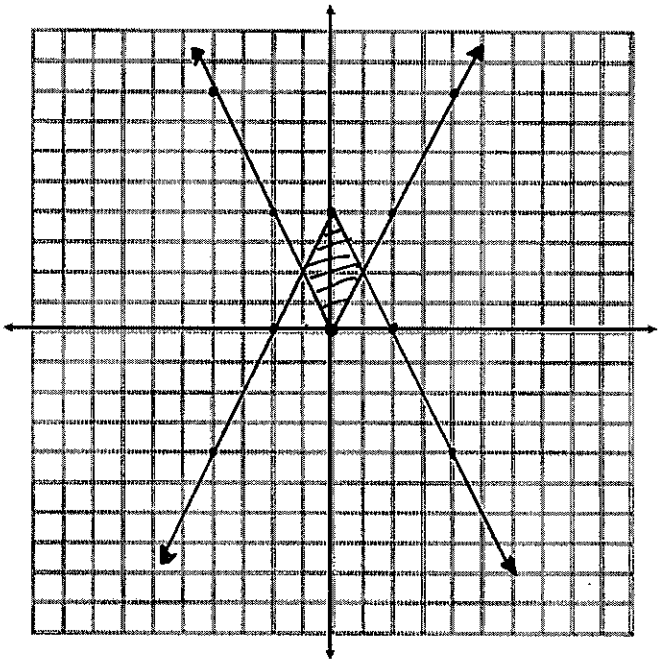
$1 = 3m - 5$ $\quad$ $1 = 2 \cdot 3 + b$

$m = 2$ $\quad$ $b = -5$

$m + b = -3$

7. Use a table of values to graph the equations mentioned in the following problem. Then, answer the question.

What is the number of square units in the area of the region bounded by the graphs of $y = 2|x|$ and $y = -2|x| + 4$ (3)



$y = 2|x|$

x	y
-4	8
-2	4
0	0
2	4
4	8

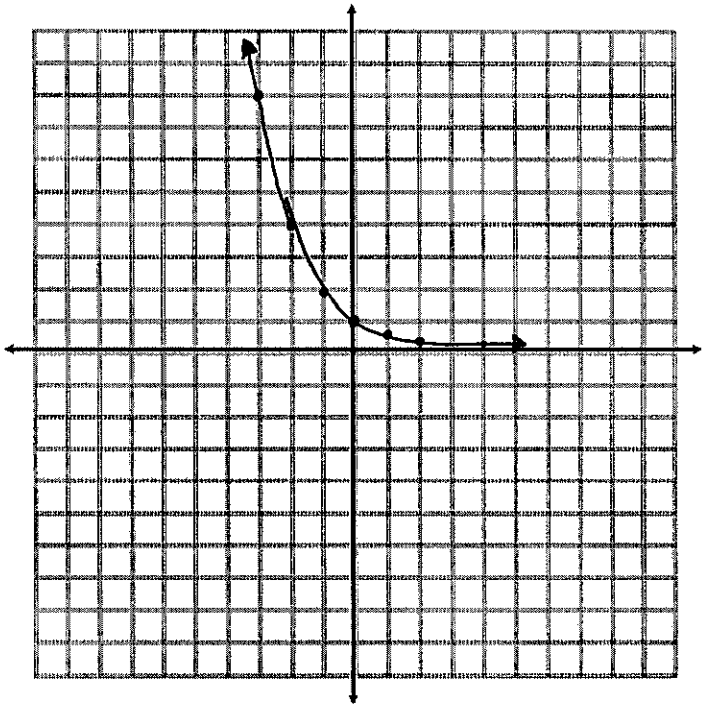
$y = -2|x| + 4$

x	y
-4	-4
-2	0
0	4
2	0
4	-4

AREA = 4 square units

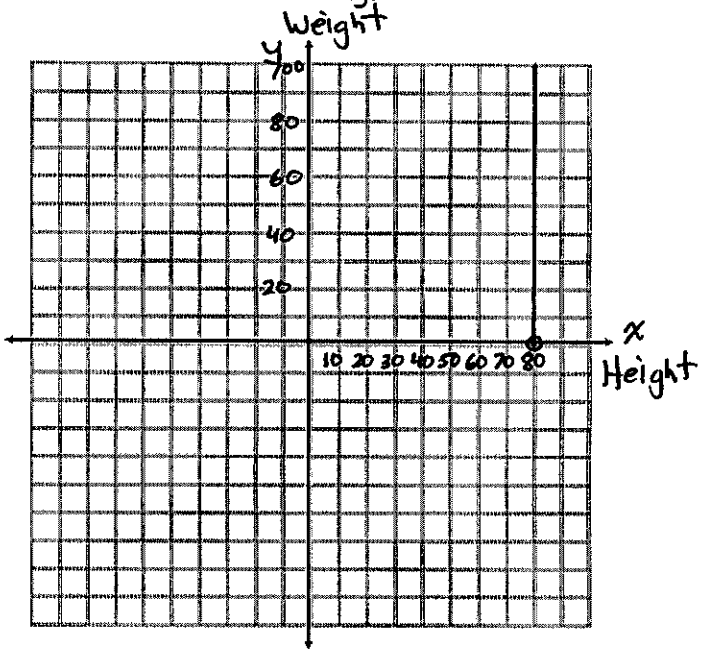
8. Use a table of values to graph the following function: $y = \left(\frac{1}{2}\right)^x$ (2 pts)

x	y
~~-4~~	~~16~~
-1	2
0	1
2	1/4
4	1/16
-2	4
-3	8
1	1/2



9. On the planet of Creon, every creature is exactly the same height (80 cm), but no creature is the same weight, though the heaviest creature is 100 kg.

a. Graph the relationship between x, the height of each creature, and y, each creature's weight. (1 pt)



b. Write an equation for this graph? (1 pt)

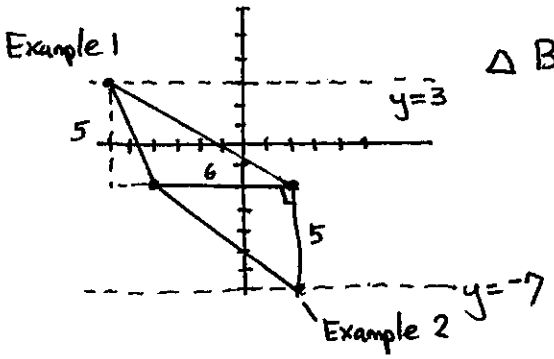
$x = 80$

c. What is the Domain of this graph? Range? (2 pts)

Domain : $x = 80$

Range : $0 < y \leq 100$

10. Two vertices of a triangle are located (-4,-2) and (2,-2). If the area of the triangle is 15 square units, what are all the possible positions for the third vertex? (2 pts)

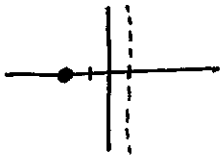


Δ Base = 6, so its height must be 5 for the area to equal 15.

The third vertex can be anywhere along the lines $y=3$ or $y=-7$

Examples 1 and 2 are 2 such points

11. If (-2,0) and (1,s) are two points on a line with a negative slope, what can you say about s? (2 pts)



For the slope to be negative, (1,s) must be on the dotted line below the x-axis.

Therefore, $s < 0$

12. If a coordinate plane were placed on top of the map of Math City, Algebra Lane would go through the points (0, 0) and (5, 2). Geometry Boulevard runs perpendicular to Algebra Lane and passes through the points (0, 5) and (-2, y). Find the value of y algebraically? (2)

For the streets to be perpendicular, the product of their slopes must equal -1.

Algebra Lane Slope $= \frac{2-0}{5-0} = \frac{2}{5}$

so Geometry Boulevard slope must equal $-\frac{5}{2}$

So, $\frac{y-5}{-2-0} = \frac{-5}{2}$

$\frac{y-5}{-2} = \frac{-5}{2}$

$2(y-5) = 10$

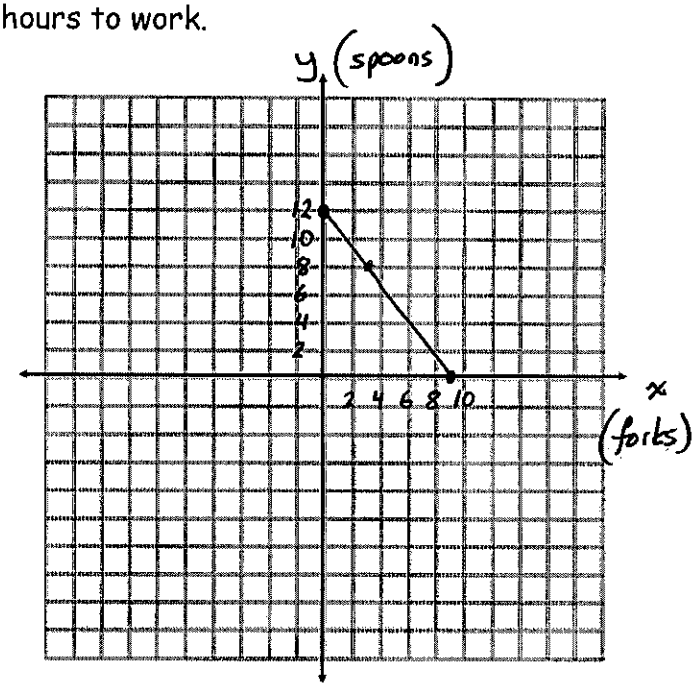
$y-5 = 5$

$y = 10$

13. Steve is making crafts to sell at a fair. It takes him $\frac{2}{3}$ of an hour to make a wooden fork and $\frac{1}{2}$ hour to make a wooden spoon. He has 6 hours to work.

A. Write an equation to show the relationship between how many forks and spoons Steve can make in three hours. Let x = the number of forks and y = the number of spoons. (2)

$\frac{2}{3}x + \frac{1}{2}y = 6$



B. Graph your equation from Part A. (2)

when $x=0$ $y=12$; when $y=0$, $x=9$ →

C. What is the x-intercept? What does it represent in this situation? (1)

$(9,0)$: If he makes 0 spoons, he can make 9 forks

D. What is the y-intercept? What does it represent in this situation? (1)

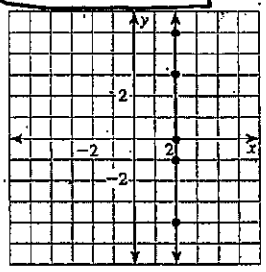
$(0,12)$ If he makes 0 forks, he can make 12 spoons

E. If Steve works the entire 6 hours while making 8 spoons, how many forks did he make? (1)

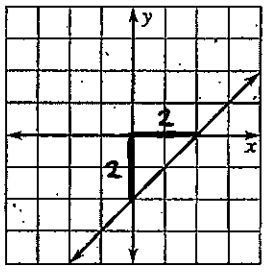
$y=8$ so $\frac{2}{3}x + \frac{1}{2}\cdot 8 = 6 \rightarrow \frac{2}{3}x + 4 = 6 \rightarrow \frac{2}{3}x = 2 \rightarrow x = 3$ **3 forks**

14. What is the slope of each line pictured below? (2 pts total)

a. **undefined**



b.



$\frac{2}{2} =$ **1**

15. Weight varies directly with gravity. A person who weighs 150 pounds on Earth weighs 57 pounds on Mars.

$E = M \cdot K$ so $K = \frac{150}{57}$

a. Write an equation that relates a person's weight, E, on Earth to that person's weight, M, on Mars. (1 pt) $E = \frac{150}{57}M$

b. A person weighs 210 pounds on Earth. Estimate that person's weight on Mars. (1 pt)

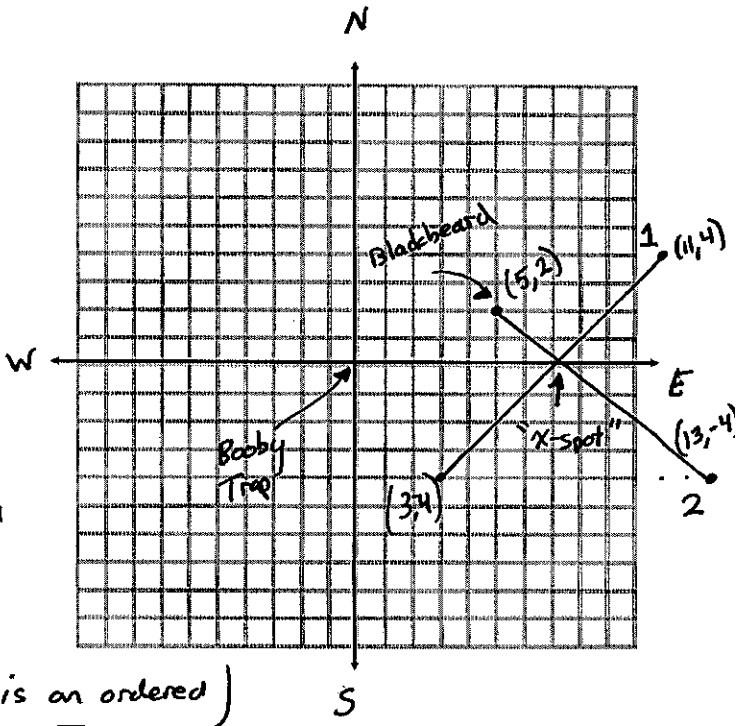
$210 = \frac{150}{57}M$

$\frac{210 \cdot 57}{150} = M$

$79.8 = M$

$M \approx 80$ pounds

16. Blackbeard was standing at a point 5 steps East and 2 steps North of a booby trap, with a long rope in his hand. Holding one ~~end~~ end in his hand, he gave the other end to one of his men and directed him to walk 6 steps south and 8 steps east. He gave another rope to each of two other men, instructing one to walk to a spot 6 steps due east and 2 steps due north of his position. He told the third man to walk to a spot that was 6 steps due south and 2 steps due west. Blackbeard decided to bury a treasure at the point where the two ropes crossed. Determine the exact coordinates of that "x" spot **using algebra.** (3 pts)



Find an equation for both lines. The "x-spot" is an ordered pair that is a solution to both equations.

Line 1

slope = $\frac{4-(-4)}{11-3} = \frac{8}{8} = 1$

Equation: $y-4 = 1(x-11)$

$y = x-11+4$

$y = x-7$

Line 2

slope = $\frac{-4-2}{13-5} = \frac{-6}{8} = -\frac{3}{4}$

Equation: $y-2 = -\frac{3}{4}(x-5)$

$y = -\frac{3}{4}x + \frac{15}{4} + 2$

$y = -\frac{3}{4}x + \frac{23}{4}$

At the x-spot, $y_{line\,1} = y_{line\,2}$

So, $x-7 = -\frac{3}{4}x + \frac{23}{4}$

$\frac{7}{4}x = \frac{51}{4}$

$x = \frac{51}{4} \cdot \frac{4}{7}$

$x = \frac{51}{7} = 7\frac{2}{7}$

and $y = x-7 = 7\frac{2}{7} - 7 = \frac{2}{7}$

So, the ordered pair is $\left(7\frac{2}{7}, \frac{2}{7}\right)$ for the "x-spot".

17. For each of the following equations,

a. $-x+2y=6$ b. $-x+2y=-2$ c. $x+2y=4$ d. $-2x+y=8$

A. Identify the slope and y-intercept of each equation's graph (4 pts total: ½ point per box)

Slope Intercept Form

		Slope	Y-Intercept
a	$-x+2y=6$	$\frac{1}{2}$	3
b	$-x+2y=-2$	$\frac{1}{2}$	-1
c	$x+2y=4$	$-\frac{1}{2}$	2
d	$-2x+y=8$	2	8

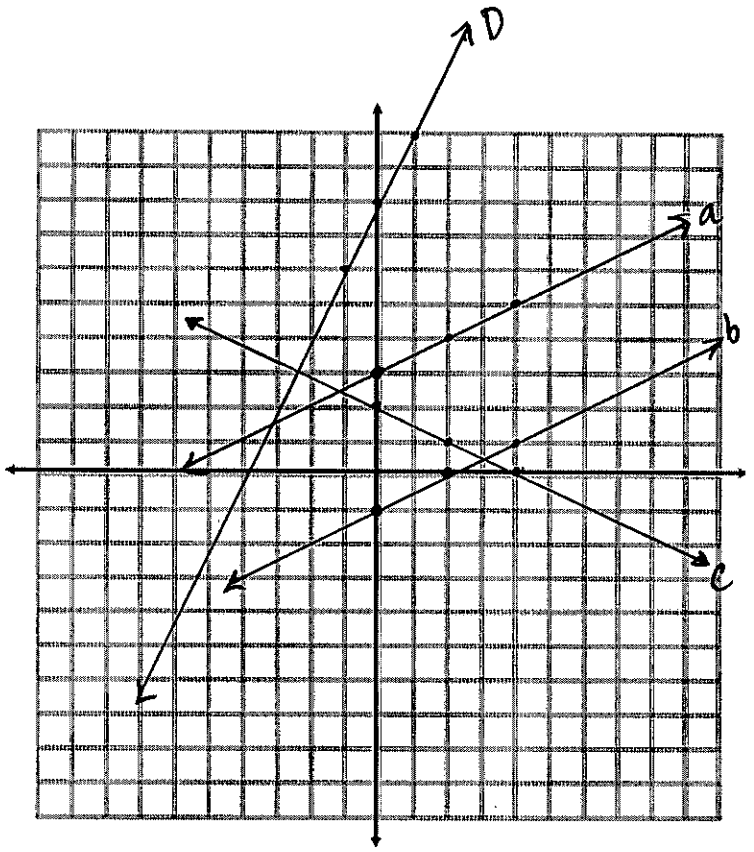
a. $y = \frac{1}{2}x + 3$

b. $y = \frac{1}{2}x - 1$

c. $y = -\frac{1}{2}x + 2$

d. $y = 2x + 8$

B. Graph and label each line on the axes shown. (4 pts)



C. Which 2 equations represent parallel lines? (1 pt) Lines a and b

D. Which 2 equations represent perpendicular lines? (1 pt)

Lines c and d

E. How can you tell which lines will be parallel and perpendicular just by looking at the equations? Explain. (2 pts)

In slope intercept form, lines a and b have the same slope. Therefore, they are parallel.

Lines c and d have slopes whose product is -1. $-\frac{1}{2}\cdot 2 = -1$. Therefore, they are perpendicular.

18. Write an equation of a line through (4,5) that is perpendicular to $y = \frac{1}{2}x + 3$ (2 pts)

To be perpendicular, slope must be -2.

$y = -2x + b$

Solve for b

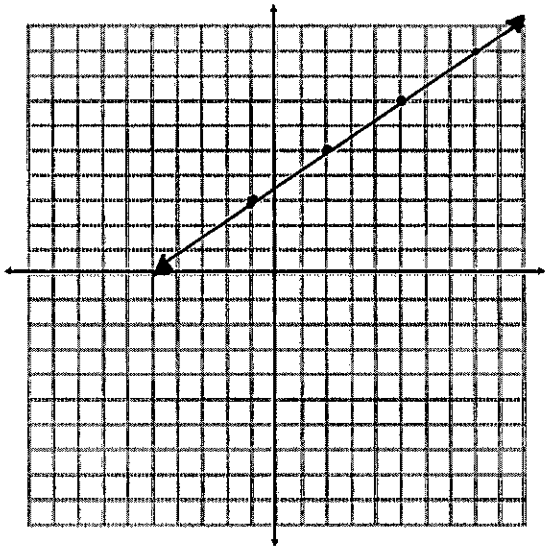
$5 = -2\cdot 4 + b$

$b = 13$

so $\boxed{y = -2x + 13}$

19. Graph the following equation: (2 pts)

$$y - 3 = \frac{2}{3}(x+1)$$

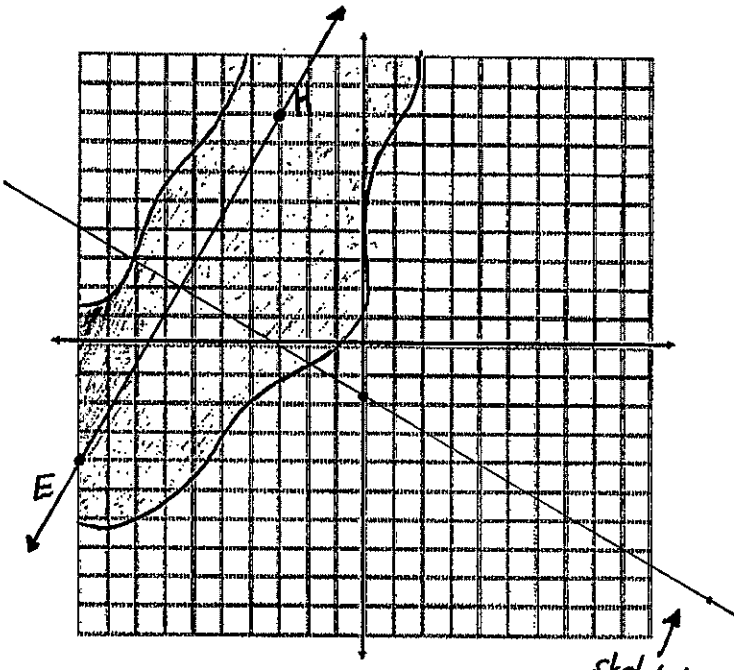


Point-slope form is

$y - y_1 = m(x - x_1)$,

so slope $= \frac{2}{3}$ and a point on the line is $(-1, 3)$

20. **Capture the Flag!** The English and History classes at Mathland High School are planning to play a game of Capture the Flag in the woods behind the school. They've been discussing how to fairly divide the woods into two territories, as the game requires. To help, they've drawn a map of the woods on a coordinate plane. The English class wants to claim the southwest territory of the woods and puts their base at (-10,-4). The History class wants to claim the northeast territory, and plans to put their base at (-3,8). Both classes agree that the perpendicular bisector of the segment joining their bases would be a fair divider between the two territories. What is the equation of that line in slope-intercept form? (3 pts)



① Slope of Line EH is $\frac{8--4}{-3--10} = \frac{12}{7}$

② Midpoint of EH is $\left(\frac{-3+-10}{2}, \frac{-4+8}{2}\right)$

$(-6.5, 2)$

③ So, the perpendicular bisector must pass through $(-6.5, 2)$ with a slope of $\frac{-7}{12}$

④ Point-Slope Form:

$y-2 = \frac{-7}{12}(x+6.5)$

$y-2 = -\frac{7}{12}x + \frac{-7}{12}\cdot\frac{13}{2}$

$y-2 = \frac{-7}{12}x + \frac{-91}{24}$

⑤ slope intercept form

$y = -\frac{7}{12}x + \frac{-91}{24} + \frac{48}{24}$

$\boxed{y = \frac{-7}{12}x - \frac{43}{24}}$ sketch to check

21. **Temperature Affects Running Speed**: The optimal running speed at 60°F is 17.6 feet per second. A person would slow down by about .3 foot per second for every 5° increase in temperature above 60°F.

A. Write an equation that represents this situation in point-slope form. (1 pt)

★ Since "Temperature affects Speed," Speed is the dependent variable.

T	Speed
60	17.6

← An ordered pair we know

★ the slope would be how much the speed change per degree, so slope $= \frac{-.3}{5} = -.06$

★ $\boxed{S-17.6 = -.06(T-60)}$

B. Now, write the equation in slope-intercept form. (1 pt)

$S-17.6 = -.06T + 3.6$

$\boxed{S = -.06T + 21.2}$

C. What is the optimal running speed if the outside temperature is 80°F? (1 pt)

if $T = 80$

$S = -.06(80) + 21.2$

$S = -4.8 + 21.2 = \boxed{16.4 \text{ feet per second}}$

22. In point-slope form, write an equation of the line that passes through the given points:

(2w,-z) and (w,w-z) (1 pt)

① Slope $= \frac{w-z-(-z)}{w-2w}$

$= \frac{w}{-w}$

$= -1$

② Point-Slope Form

$y-(-z) = -1(x-2w)$

$\boxed{y+z = -1(x-2w)}$

B. Now, write the equation in slope intercept form. (1 pt)

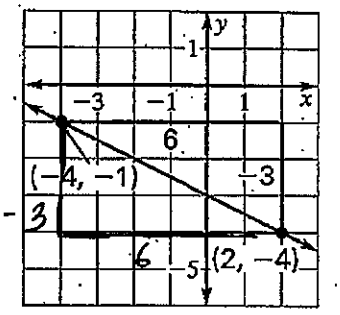
$y+z = -1(x-2w)$

$y+z = -1x+2w$

$\boxed{y = -1x+(2w-z)}$

23. Write an equation of the line in point slope form (2 pts)

Slope $= \frac{-3}{6} = \frac{-1}{2}$ $\boxed{y-(-1) = -\frac{1}{2}(x-(-4))}$



B. Now, write the equation in slope-intercept form. (1 pt)

$y+1 = -\frac{1}{2}(x+4)$

$y = -\frac{1}{2}x-2-1$

$\boxed{y = -\frac{1}{2}x-3}$

24. You have \$12 to spend on fruit for a meeting. Grapes cost \$1 per pound and peaches cost \$1.50 per pound. Let x represent the number of pounds of grapes you can buy. Let y represent the number of pounds of peaches you can buy. Write and graph an inequality to model the amounts of grapes and peaches you can buy. (1 pt)

$\boxed{1x+1.50y \leq 12}$

if $x=0$ $y=8$ $(0,8)$

if $y=0$ $x=12$ $(12,0)$

You can buy a combination that is located anywhere within the shaded region.